WHAT IS CLAIMED IS:

1. An illuminator for illuminating a surface to be illuminated with a luminous flux from a light source through an illumination system, wherein a titanium oxide film is provided on the surface of at least one unit constituting said illumination system.

2. An illuminator for illuminating a surface to be illuminated with a luminous flux from a light source through an illumination system, wherein a titanium oxide film is provided in at least one region of at least one optical unit among a plurality of optical units.

3. An illuminator for illuminating a surface to be illuminated with a luminous flux from a light source through an illumination system, wherein a titanium oxide film is provided in at least one region of a supporting unit for supporting an optical unit.

4. An illuminator according to any one of claims 1, 2, and 3, wherein said luminous flux comprises ultraviolet light, and said titanium oxide film prevents a contaminant from adhering to and contaminating a surface of the unit provided with said titanium oxide film by a photoconductive

function caused by the absorption of said ultraviolet light.

5. An illuminator according to claim 1, wherein said unit comprises at least one of a diaphragm, a shutter, and a lens barrel.

6. An illuminator according to either claim 1 or 2, wherein said unit comprises at least one of a lens, a mirror, a prism, a filter, a diffuser, a diffraction optical element, and an optical integrator.

7. An illuminator according to claim 2, wherein said optical unit comprises a diffraction optical lens using a diffraction optical element.

8. An illuminator according to claim 2, wherein said optical unit comprises a mirror.

9. An illuminator according to claim 2, wherein said titanium oxide film is provided on the surface of a portion of a region of said optical unit in which light passes through.

10. An illuminator according to any one of claims 1 to 9, wherein said titanium oxide film has a thickness ranging

from 10 nm to 100 nm.

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11. An exposure apparatus for illuminating a pattern on a mask with a luminous flux from a light source through an illumination system and exposing a wafer with said pattern, wherein a titanium oxide film is provided on the surface of at least one unit.

12. An exposure apparatus for illuminating a pattern on a mask with a luminous flux from a light source through an illumination system and exposing a wafer with said pattern, wherein a titanium oxide film is provided on the surface of at least one region of at least one optical unit among a plurality of optical units.

13. An exposure apparatus for illuminating a pattern on a mask with a luminous flux from a light source through an illumination system and exposing a wafer with said pattern, wherein a titanium oxide film is provided on the surface of at least one region of a supporting unit for supporting at least one optical unit.

14. An exposure apparatus according to any one of claims 11, 12, and 13, wherein said luminous flux comprises ultraviolet light, and said titanium oxide film prevents a

contaminant from adhering to and contaminating a surface of the unit provided with said titanium oxide film by a photoconductive function caused by the absorption of said ultraviolet light.

15. An exposure apparatus according to claim 11, wherein said unit comprises at least one of a diaphragm, a shutter, and a lens barrel.

16. An exposure apparatus according to claim 12, wherein said optical unit comprises at least one of a lens, a mirror, a prism, a filter, a diffuser, a diffraction optical element, and an optical integrator.

17. An exposure apparatus according to claim 12, wherein said optical unit comprises a diffraction optical lens using a diffraction optical element.

18. An exposure apparatus according to claim 12, wherein said optical unit comprises a mirror.

19. An exposure apparatus according to claim 12, wherein said titanium oxide film is provided on the surface of a portion of a region of said optical unit in which light passes through.

20. An exposure apparatus according to any one of claims 11 to 19, wherein exposure is performed while the pattern on said mask and said wafer are synchronously scanned.

21. An exposure apparatus according to any one of claims 11 to 20, wherein said titanium oxide film has a thickness ranging from 10 nm to 100 nm.

22. A method for fabricating a device comprising the steps of:

exposing a wafer with a pattern on a reticle after said reticle is aligned with said wafer using an exposure apparatus according to any one of claims 11 to 21; and

developing said wafer.

23. A projection aligner for illuminating a pattern on a mask with a luminous flux from a light source through an illumination system and projecting said pattern onto a wafer by a projection optical system, wherein a titanium oxide film is provided on the surface of at least one unit.

24. A projection aligner for illuminating a pattern on a mask with a luminous flux from a light source through an

illumination system and projecting said pattern onto a wafer by a projection optical system, wherein a titanium oxide film is provided on the surface of at least one region of at least one optical unit among a plurality of optical units.

25. A projection aligner for illuminating a pattern on a mask with a luminous flux from a light source through an illumination system and projecting said pattern onto a wafer by a projection optical system, wherein a titanium oxide film is provided on the surface of at least one region of a supporting unit for supporting at least one optical unit.

26. A projection aligner according to any one of claims 23, 24, and 25, wherein said luminous flux comprises ultraviolet light, and said titanium oxide film prevents a contaminant from adhering to and contaminating a surface of the unit provided with said titanium oxide film by a photoconductive function caused by the absorption of said ultraviolet light.

27. A projection aligner according to claim 23, wherein said unit comprises at least one of a diaphragm, a shutter, and a lens barrel.

28. A projection aligner according to claim 24,

wherein said optical unit comprises at least one of a lens, a mirror, a prism, a filter, a diffuser, a diffraction optical element, and an optical integrator.

29. A projection aligner according to claim 24, wherein said optical unit comprises a diffraction optical lens using a diffraction optical element.

30. A projection aligner according to claim 24, wherein said optical unit comprises a mirror.

31. A projection aligner according to claim 24, wherein said titanium oxide film is provided on the surface of a portion of a region of said optical unit in which light passes through.

32. A projection aligner according to any one of claims 23 to 31, wherein projection and exposure are performed while said mask and said wafer are synchronously scanned at a velocity ratio in response to imaging magnification of said projection optical system.

33. A projection aligner according to any one of claims 23 to 32, wherein said titanium oxide film has a thickness ranging from 10 nm to 100 nm.

34. A method for fabricating a device, said method comprising the steps of:

projecting and exposing a wafer with a pattern on a reticle after said reticle is aligned with said wafer using a projection aligner according to any one of claims 23 to 33; and

developing said wafer.